

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

REVISED MONITORING AND REPORTING PROGRAM ORDER NO. R5-2008-0148
FOR

LAWRENCE LIVERMORE NATIONAL SECURITY, LLC
AND

THE U.S. DEPARTMENT OF ENERGY

LAWRENCE LIVERMORE NATIONAL LABORATORY
EXPERIMENTAL TEST SITE (SITE 300)
SEWAGE EVAPORATION AND PERCOLATION PONDS
SEPTIC SYSTEMS
COOLING TOWER DISCHARGES
MECHANICAL EQUIPMENT WASTEWATER DISCHARGES
AND
OTHER LOW-THREAT DISCHARGES
ALAMEDA AND SAN JOAQUIN COUNTIES

This Monitoring and Reporting Program (MRP) describes requirements for monitoring discharges to the sewage evaporation and percolation ponds (sewage ponds), to septic systems, cooling tower and mechanical equipment discharges to percolation pits, other low-threat discharges to land and of groundwater downgradient of the sewage ponds. Attachment 1 shows the discharge locations for the sewage ponds, percolation pits and septic systems. This MRP is issued to the U.S. Department of Energy and Lawrence Livermore National Security, LLC (hereafter jointly referred to a Discharger) pursuant to Section 13267 of the California Water Code and is designed to determine if permitted wastewater discharges are impacting or have the potential to impact groundwater. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer.

Prior to construction of any new groundwater monitoring wells, the Discharger shall submit plans and specifications to the Regional Water Quality Control Board, Central Valley Region (hereafter Central Valley Water Board) for review and approval. Once installed, all new wells shall be added to the monitoring program described below for the area in which they were installed.

SEWAGE EVAPORATION AND PERCOLATION PONDS

Influent and Pond Monitoring

1. Influent samples shall be collected just prior to discharge to the disposal facility (Location ISWP as shown on Attachment 2). The influent waste stream shall be sampled and analyzed **semi-annually** (twice a year) for specific conductance (SC), pH, and biochemical oxygen demand (BOD). Table 1 lists analytical methods and reporting limits.

2. The sewage evaporation pond (Location ESWP as shown on Attachment 2) shall be sampled and analyzed **semi-annually** for the all analytes listed on **Table 1**. Table 1 lists analytical methods and reporting limits.
3. The sewage evaporation pond shall be observed **monthly** for freeboard, color, odor, and levee condition.
4. When discharge to the percolation pond (Location DSWP is shown on Attachment 2) occurs, the discharge shall be sampled for the all analytes per analytical methods and reporting limits listed on **Table 1**.
5. When discharging superchlorinated water to the sewage evaporation pond, the Discharger must verify by sampling for chlorine residual that the dechlorination process has reduced the chlorine residual to a level no greater than 2 parts per million.

Table 1. Sewage ponds wastewater analytes, analytical methods and reporting limits.

Analyte	EPA (E) or Standard Method (SM) ¹	Reporting limit ²	Units
Specific conductance	E120.1 or calibrated field meter	Not applicable	µmhos/cm
pH	E150.1 or calibrated field meter	± 0.1	unitless
Aluminum	E200.7 or E200.8	0.05	mg/L
Arsenic	E200.8	0.002	mg/L
Barium	E200.7 or E200.8	0.025	mg/L
Boron	E200.7	0.05	mg/L
Cadmium	E200.8 or 3113B	0.05	mg/L
Calcium	E200.7	0.5	mg/L
Chromium	E200.8 or 3113B	0.001	mg/L
Chromium (VI)	E218.6, 7199 or E200.8	0.001	mg/L
Copper	E220.2 or E200.8	0.001	mg/L
Iron	E200.7	0.1	mg/L
Lead	E239.2 or E200.8	0.005	mg/L
Magnesium	E200.7	0.5	mg/ L
Manganese	E200.7 or E200.8	0.03	mg/L
Mercury	SM3112B or E245.2	0.0002	mg/L
Molybdenum	E200.7 or E200.8	0.025	mg/L
Nickel	E249.2 or E200.8	0.002	mg/L
Potassium	E200.7	1	mg/L
Selenium	E270.2 or E270.3 or E200.8	0.002	mg/L
Silver	SM3113B, E200.8, or E200.7	0.01	mg/L
Sodium	E200.7	11	mg/L
Vanadium	E200.7 or E200.8	0.02	mg/L

Table 1 continued. Sewage ponds wastewater analytes, analytical methods and reporting limits.

Analyte	EPA (E) or Standard Method (SM) ¹	Reporting limit ²	Units
Zinc	E200.7 or E200.8	0.02	mg/L
Dissolved oxygen	E 360.1 or calibrated field meter	0.05	mg/L
Biochemical oxygen demand	SM 5210B	2	mg/L
Total coliform	SM 9211	2	MPN/100mL
Fecal coliform	SM 9211	2	MPN/100mL

¹ Or equivalent method as approved by the Central Valley Water Board.

² All detections between the reporting limit and detection limit shall be reported as estimated with a "J" flag.

Groundwater Monitoring

- Groundwater near and below the sewage evaporation and percolation ponds shall be sampled and analyzed semi-annually from upgradient wells W-7ES and W-7PS, crossgradient monitoring well W-35A-04, and downgradient monitoring wells W-26R-01, W-25N-22, W-26R-05, W-26R-11, W-25N-20, W-25N-23 and W-7DS for the analytes listed on **Table 2**. Well locations are shown on Attachment 2. Table 2 below lists analytical methods and reporting limits.
- Semi-annual sample collection shall be separated by at least 3 months and collected during periods that represent seasonally high and seasonally low ground water elevations.

Table 2. Sewage ponds groundwater analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM) ¹	Reporting Limit ²	Units
Ground water elevation	Field measurement	Not applicable	Feet or Meters
Specific conductance	E120.1 or calibrated field meter	Not applicable	µmhos/cm
pH	E150.1 or calibrated field meter	± 0.1	Unitless
Total coliform	SM 9211	2	MPN/100mL
Fecal coliform	SM 9211	2	MPN/100mL
Chloride	E300.0	0.5	mg/L
Nitrate as NO ₃	E300.0, E354.1, or E353.2	0.5	mg/L
Sulfate	E300.0	1	mg/L
Total Dissolved Solids (TDS)	E160.1	1	mg/L
Aluminum	E200.7 or E200.8	0.05	mg/L

Table 2 continued. Sewage ponds groundwater analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM)¹	Reporting Limit²	Units
Arsenic	E200.8	0.002	mg/L
Barium	E200.7 or E200.8	0.025	mg/L
Boron	E200.7	0.05	mg/L
Cadmium	E200.8 or 3113B	0.05	mg/L
Calcium	E200.7	0.5	mg/L
Chromium	E200.8 or 3113B	0.001	mg/L
Chromium (VI)	E218.6, 7199 or E200.8	0.001	mg/L
Copper	E220.2 or E200.8	0.001	mg/L
Iron	E200.7	0.1	mg/L
Lead	E239.2 or E200.8	0.005	mg/L
Magnesium	E200.7	0.5	mg/L
Manganese	E200.7 or E200.8	0.03	mg/L
Mercury	SM3112B or E245.2	0.0002	mg/L
Molybdenum	E200.7 or E200.8	0.025	mg/L
Nickel	E249.2 or E200.8	0.002	mg/L
Potassium	E200.7	1	mg/L
Selenium	E270.2 or E270.3 or E200.8	0.002	mg/L
Silver	SM3113B, E200.8, or E200.7	0.01	mg/L
Sodium	E200.7	11	mg/L
Vanadium	E200.7 or E200.8	0.02	mg/L
Zinc	E200.7 or E200.8	0.02	mg/L

¹ Or equivalent method as approved by the Central Valley Water Board.

² All detections between the reporting limit and detection limit shall be reported as estimated with a "J" flag.

PERCOLATION PIT INSPECTIONS

8. The Discharger shall inspect **monthly** the five mechanical equipment percolation pits located at Buildings 806A, 827 A, C, D, and E to verify that they are operating properly. If standing water is visible during the quarterly inspection, the Discharger shall increase the inspection frequency to **weekly** until no standing water is visible.
9. The Discharger shall inspect **monthly** the seven cooling tower percolation pits located at Buildings 801, 809, 812, 817A, 826, 827A, and 851. If standing water is visible during the quarterly inspection the Discharger shall increase the inspection frequency to **weekly** until no standing water is visible. The more frequent inspections are required at percolation pits with standing water in order to prevent overflow of the percolation pits.

COOLING TOWER BLOWDOWN EFFLUENT MONITORING

10. The Discharger shall **semi-annually** collect representative grab samples of blowdown discharges from each active cooling tower for the analytes shown in **Table 3**. Active cooling towers which discharge to percolation pits are located at Buildings 801, 809, 817A, 826, 827A, and 851. The cooling tower which discharges to a septic system is located at Building 825,.
11. The Discharger shall also record the total flow monthly blowdown flow from the cooling towers.

MECHANICAL EQUIPMENT DISCHARGE EFFLUENT MONITORING

12. The Discharger shall collect **semi-annually** representative grab samples of mechanical equipment discharges at Buildings 827 A, C, D, E and 806A for the analytes shown in **Table 3**. The Discharger shall retrofit the percolation pit discharges to facilitate the collection of composite samples. Starting in the **first six months of 2010**, the Discharger shall collect **semi-annually** composite samples of mechanical equipment discharges at Buildings 827 A, C, D, E and 806A for the analytes shown in **Table 3**. Composite samples shall be representative of the combined discharge to the percolation pit over a period of operation occurring within a single day at each specified facility.

Table 3. Cooling tower and mechanical equipment effluent analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM) ¹	Reporting Limit ²	Units
Aluminum	E200.7 or E200.8	0.05	mg/L
Arsenic	E200.8	0.002	mg/L
Barium	E200.7 or E200.8	0.025	mg/L
Boron	E200.7	0.05	mg/L
Cadmium	E200.8 or 3113B	0.05	mg/L
Calcium	E200.7	0.5	mg/L
Chloride	E300.0	0.5	mg/L
Chromium	E200.8 or 3113B	0.001	mg/L
Chromium (VI)	E218.6, 7199 or E200.8	0.001	mg/L
Copper	E220.2 or E200.8	0.001	mg/L
Fluoride	E300 or SM4500F	0.05	mg/L
Iron	E200.7	0.1	mg/L
Lead	E239.2 or E200.8	0.005	mg/L
Magnesium	E200.7	0.5	mg/L
Manganese	E200.7 or E200.8	0.03	mg/L
Mercury	SM3112B or E245.2	0.0002	mg/L

Table 3 continued. Cooling tower and mechanical equipment effluent analytes, analytical methods and reporting limits

Analyte	EPA (E) or Standard Method (SM) ¹	Reporting Limit ²	Units
Molybdenum	E200.7 or E200.8	0.025	mg/L
Nickel	E249.2 or E200.8	0.002	mg/L
Nitrate (as NO ₃)	E300.0, E354.1, or E353.2	0.5	mg/L
pH (pH units)	M4500-H or calibrated meter	± 0.1	Unitless
Potassium	E200.7	1	mg/L
Selenium	E270.2 or E270.3 or E200.8	0.002	mg/L
Silver	SM3113B, E200.8, or E200.7	0.01	mg/L
Sodium	E200.7	11	mg/L
Specific conductance	E120.1 or calibrated meter	na	µmhos/cm
Sulfate	E300.0	1	mg/L
Total alkalinity (as CaCO ₃)	E310.1 or SM2320B	1	mg/L
Total dissolved solids (TDS)	E160.1 or SM2320C	1	mg/L
Total hardness (as CaCO ₃)	SM2320B	1	mg/L
Total phosphorus (as PO ₄)	SM 4500-P or E365.4	0.05	mg/L
Vanadium	E200.7 or E200.8	0.02	mg/L
Zinc	E200.7 or E200.8	0.02	mg/L

¹ Or equivalent method as approved by the Central Valley Water Board.

² All detections between the reporting limit and detection limit shall be reported as estimated with a "J" flag.

REPORTING

13. In reporting all monitoring data, the Discharger shall arrange the data in tabular form so that the sampling location, sample type (e.g. effluent, groundwater, etc.), date, constituents, concentrations and units are readily discernible. The data shall be summarized in such a manner as to illustrate clearly the compliance with this Order. A short discussion of the monitoring results, including notations of any water quality violations, shall precede the tabular data.
14. As required by the California Business and Professions Code Sections 6735, 7835, and 7835.1, all water monitoring reports shall be prepared under the direct supervision of a California Registered Professional Engineer or Geologist and signed by the registered professional.
15. The results of any monitoring done more frequently than required at the locations specified in the MRP also shall be reported to the Central Valley Water Board.

Semi-Annual Monitoring Reports

16. The Discharger shall submit semi-annual electronic data reports, which conform to the requirements of the California Code of Regulations, Title 23, Division 3, Chapter 30. The semi-annual reports shall be submitted electronically over the internet to the State Water Board Geotracker database system by the **1st day of the third month following the second and fourth calendar quarter (i.e. by 1 March and 1 September)** until such time as the Executive Officer determines that the reports are no longer necessary.
17. In addition, hardcopies of the semi-annual monitoring reports shall be submitted to the Central Valley Water Board by the **1st day of the third month following the second and fourth calendar quarter (i.e. by 1 March and 1 September)** until such time as the Executive Officer determines that the reports are no longer necessary. Each semi-annual report shall include the following minimum information:
 - a. A narrative description of all preparatory, monitoring, sampling and analytical testing activities, including trends in the concentrations of pollutants, if applicable, groundwater elevations in the wells, and how and when samples were collected.
 - b. The narrative shall be supported by field logs for each groundwater monitoring well documenting depth to groundwater; measuring point elevation (e.g. top of casing elevation), parameters measured before, during, and after purging; method of purging; calculation of the casing volume; and total volume of water purged.
 - c. Groundwater contour maps for all groundwater zones, if applicable.
 - d. A table showing well construction details such as well number, groundwater zone being monitored, coordinates (longitude and latitude), ground surface elevation, reference elevation, elevation of screen, elevation of bentonite, elevation of filter pack, and elevation of well bottom.
 - e. Cumulative data tables containing the water quality analytical results and depth to groundwater.
 - f. The frequency, quantity and discharge method and location of wastewater generated from the operation and maintenance of the drinking water system.
18. Copies of the laboratory analytical data reports shall be maintained by the Discharger and provided upon request to the Central Valley Water Board or its representatives.

Annual Monitoring Report

19. An annual report shall be submitted to the Central Valley Water Board. The annual report may either be included in the submission of the second semi-annual report or as a separate report to be submitted by **1 March of each year**. The report shall discuss the compliance record and corrective actions taken or planned which may be needed to bring the discharge into full compliance with the waste discharge requirements.
20. The Annual Report shall contain the following minimum information:
 - a. Tabular summaries of all data obtained during the year and graphical summaries of all groundwater monitoring data obtained during the last five years.
 - b. Groundwater elevation contour maps.
 - c. Maps showing each discharge area where groundwater monitoring is required. The maps shall include monitoring well locations and constituent concentrations for individual wells for each constituent in the groundwater monitoring program for the discharge.
 - d. An evaluation of the groundwater quality beneath and downgradient of each wastewater treatment facility.
 - e. An identification of any data gaps and potential deficiencies/redundancies in the monitoring system or reporting program.
 - f. If desired, a proposal and rationale for any revisions to the groundwater sampling plan frequency and/or list of analytes.

The Discharger shall implement the above monitoring program on the first day of the month following the date of the signature below.

Ordered by: _____
PAMELA C. CREEDON, Executive Officer

(Date)